

## ABSTRACT

Methods and apparatus are provided for determining a characteristic of a sample of a material by the interaction of electromagnetic radiation with the sample. The apparatus includes a source of electromagnetic radiation, an optical assembly and a detector. The optical assembly sequentially illuminates a plurality of volume elements in the sample with an intensity distribution in the sample that drops off substantially monotonically from a first region in a first optical path and collects electromagnetic radiation emanating from each of the volume elements. The optical assembly collects the electromagnetic radiation emanating from each of the volume elements with a collected distribution that drops off substantially monotonically from a second region in a second optical path. The first and second regions at least partially overlap in each of the volume elements. The detector detects the collected electromagnetic radiation emanating from each of the sequentially illuminated volume elements to produce responses representative of the characteristic in each of the volume elements.